Mitoxantrone (X = OH)Ametantrone (X = H)

FIG. 1

$$\begin{array}{c|c}
CI & & & & & \\
R-SH & & & & \\
\hline
CI & O & & & \\
R & & & & \\
\end{array}$$

Reagents: (a) Sodium methoxide/methanol; tet rahydrofuran, reflux.

Reagents: (b) Method A, pyridine; Method B, NaH, THF.

FIG. 3

$$\begin{array}{c|c}
CI & O & CI \\
\hline
RNH_2 & O & HN & R \\
\hline
RNH & O & HN & R
\end{array}$$

(a) DMF, heated in the glass mini-reactor..

FIG. 4

$$\begin{array}{c|c} CI & O & CI \\ \hline \\ RNH_2 \\ \hline \\ O \\ \end{array}$$

$$\begin{array}{c} RNH_2 \\ \hline \\ O \\ \end{array}$$

$$\begin{array}{c} RNH_2 \\ \hline \\ O \\ \end{array}$$

FIG. 5

FIG. 6

FIG. 7

$$A = D = NH_2$$

$$B = E = H$$

$$O$$

$$O$$

$$HN$$

$$Rd$$

$$NH$$

$$O$$

FIG. 8